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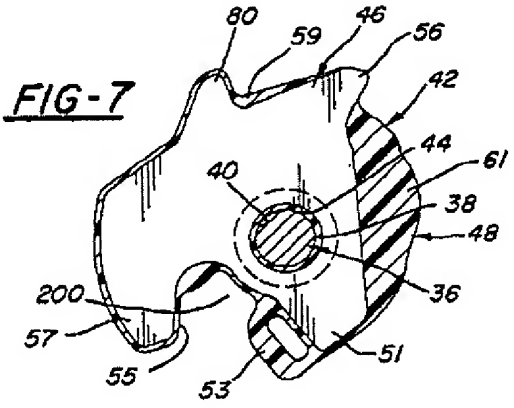
(54) Vehicle closure latch and ratchet therefor.

(57) A ratchet type vehicle closure latch is secured to a vehicle door by a pair of bolts. The ratchet (42) is defined by a metal substrate (46) which has a plastic covering (48). The vehicle closure latch can have several other non-metallic parts for minimising the metal-on-metal engagement, operational noise and lubrication requirements.

FIG-7



EP 0 669 437 A1

This invention relates to a vehicle closure latch and more particularly to a ratchet type vehicle closure latch, and a ratchet therefor.

Ratchet type vehicle closure latches are well known and have been used for many years. See for example, US Patent No. 4,756,563.

The object of the present invention is to provide a ratchet type vehicle closure latch that has a ratchet that reduces operating noise and lubrication requirements of the vehicle closure latch.

To this end, a vehicle closure latch, and a ratchet therefor, are characterised by the features specified in Claims 1 and 8, respectively.

A feature of the vehicle closure latch of this invention is that the vehicle closure latch has a ratchet that eliminates virtually all metal-to-metal contact except for the engagement of the ratchet and the pawl in the primary latch position.

Another feature of the vehicle closure latch of this invention is that the vehicle closure latch has a ratchet that comprises a metal substrate that is may be injection moulded in plastic to provide sound deadening cushions to quiet operation.

Still another feature of the vehicle closure latch of the invention is that the vehicle closure latch is economical to manufacture because the metal substrate for the ratchet may be a non-handed part that can be used in right hand and left hand assemblies.

The present invention will now be described, by way of example, with reference to the accompanying drawings, in which:-

Figure 1 is a partially broken away front view showing a vehicle closure latch of the present invention in a latched and unlocked condition in solid lines, and with various parts also shown in phantom in unlatching or locked positions;

Figure 2 is a sectional view taken substantially along line 2-2 of Figure 1 in which an intermittent lever is also shown in phantom in a locked position;

Figure 3 is a rear view taken substantially along line 3-3 of Figure 2 with the latched and unlocked conditions shown in solid lines while various parts are also shown in phantom in unlatching or locked positions;

Figure 4 is a partial sectional view taken substantially along line 4-4 of Figure 1 with various parts also shown in phantom in unlatching or locked positions;

Figure 5 is a view similar to Figure 1 showing the vehicle closure latch in an unlatched and unlocked condition;

Figure 6 is an exploded perspective view of the vehicle closure latch and a fragment of the door on which it is installed; and

Figure 7 is an enlarged front view of the insert moulded closure latch ratchet.

Referring to Figures 1, 2 and 6, a vehicle closure latch 10 includes a one-piece moulded plastic housing 12 which opens to a front side 14. The housing 12 includes a relatively thin, broken peripheral wall 16, that outlines a cavity that has a recessed base wall 18. The housing 12 also has a number of coplanar shelf portions 20 inside the peripheral wall 16 that are only slightly recessed. A metal cover plate or frame 26 fits within the peripheral wall 16, and seats on the shelf portions 20 to close the front side 14 of the housing 12. The frame 26 includes an inwardly recessed upper corner portion 28, an extruded central portion 30 and a pair of side tabs 32 and 33 as shown in Figure 6.

A ratchet stud 36 is received by the extruded central portion 30 of the frame 26 which provides an increased support surface for the head end of the ratchet stud 36. A portion of the ratchet stud 36 is disposed in a thin plastic sleeve 37 that is integrally attached to the housing 12 and then in a hole 40 through the base wall 18 as shown in Figure 2. The thin plastic sleeve 37 facilitates assembly and then breaks away in service to provide a sleeve bearing 38 between the ratchet stud 36 and a rotatable closure latch ratchet 42.

Referring now to Figures 1, 6 and 7, the ratchet 42 comprises a metal substrate 46 that has a hole 44 that receives the ratchet stud 36 and the sleeve bearing 38 so that the ratchet 42 rotates on the ratchet stud 36 without any metal-to-metal contact. The integral plastic sleeve 37 then has two primary functions, that of locating the ratchet 42 during assembly, and that of providing a sleeve bearing 38 that eliminates metal-to-metal contact between the ratchet 42 and the ratchet stud 36 when the ratchet 42 rotates in service.

The metal substrate 46 which is best shown in hidden line in Figure 7, is injection moulded in a covering 48 of relatively tough and stiff thermoplastic material such as Santoprene, a product of Monsanto Company of St. Louis, MO. The plastic covering 48 does not cover the hole 44 or the faces of the metal substrate 46 near the hole 44 of the ratchet 42, as best seen in Figures 5, 6 and 7 to avoid interfering with rotation of the ratchet 42.

The plastic covering 48 also does not cover the peripheral surface of a primary latching tooth 56 so that there is metal-to-metal contact between the primary latching tooth 56 and a pawl 60 when the ratchet 42 is in the latched position as shown in Figures 1 and 5. The plastic covering 48, however does has a substantial presence in other peripheral areas. The covering 48 includes a thick portion in front of a striker tooth 51 that is slotted to provide an integral bumper 53 for cushioning initial engagement of a striker when the vehicle door is closed as explained below. The plastic covering 48 also includes another cushion 55 covering a keeper

portion 57 of the ratchet 42 that engages the striker when the ratchet is in the latched position as shown in Figures 1 and 5. The plastic covering 48 also includes yet another cushion 59 that covers the periphery of the substrate 46 between the keeper portion 57 and the peak of the primary latching tooth 56 for quiet operation as the pawl 60 ratchets over a secondary latching tooth 80 when the door is closed. The plastic covering 48 further includes a substantially chord shaped area 61 between the primary latching tooth 56 and the striker tooth 51 that reduces the size and weight of the metal substrate 46 and also provides a base for an integral pin 43. By chord shaped area is meant a segment of a circle which comprises an arc of the circle and a chord between the ends of the arc.

Referring now to Figure 2, a groove 50 in the recessed base wall 18 houses a coil compression spring 52. The pin 43, as seen in hidden line in Figure 1, moulded integral with the sound deadening plastic covering 48 of the ratchet 42, engages one end of the coil compression spring 52. The other end of the coil compression spring 52 engages an end wall of the groove 50, so that the spring 52 biases the ratchet 42 clockwise from a latched position shown in solid line in Figure 1 through an intermediate latched position (not shown) to an unlatched position shown in phantom in Figure 1 and in solid line in Figure 5 when pawl 60 is disengaged. The primary latching tooth 56 engages a shoulder 58 of the housing 12 to stop the ratchet 42 in the unlatched position.

Referring now to Figures 2 and 6, the pawl 60 is pivotally mounted on a pawl stud 62 for movement between an engaged position shown in solid line in Figure 5 and an unlatching position shown in phantom in Figure 5. A groove 68 in one of shelf portions 20 of the housing 12 houses a second coil compression spring 70. A shoulder 72 of the pawl 60 engages one end of the coil compression spring 70. The other end of the spring 70 engages an end wall of the groove 68 biasing the pawl 60 counter clockwise, as viewed in Figures 1 and 5, toward the engaged position. The pawl 60 has a pawl tooth 76 which engages the primary latching tooth 56 of the ratchet 42 as shown in Figure 1 to latch the ratchet 42 in the fully latched position. Although not shown in the drawings, the pawl tooth 76 is also engageable with the secondary latching tooth 80 of the ratchet 42 to locate the ratchet 42 in an intermediate latched position where the ratchet 42 retains a striker 188 loosely.

Referring to Figures 2 and 3, the housing 12 has a back side 82 with a series of rear base wall portions 84, 86, and 90, which are parallel. A metal back plate 92 engages the outer rear base wall portion 90 and includes a plurality of recessed portions 94 and 96 as shown in Figure 6.

Referring to Figures 2 and 6, a non-metallic or plastic pawl release lever 100 is coaxially pivoted with the pawl 60 on the pawl stud 62 and between the rear base wall portion 84 and a rib 102 of the pawl stud 62. Referring to Figure 1, the pawl release lever 100 has a lateral tab 104 which extends through a slot 106 in the housing 12 and is received by a notch 108 of the pawl 60 to couple the pawl release lever 100 to the pawl 60. Referring to Figures 3 and 6, an offset foot 110 of the pawl release lever 100 is engageable by an integral ear 111 of a non-metallic or plastic moulded intermittent lever 116.

Referring to Figures 2 and 3, the integral ear 111 of the intermittent lever 116 has a pin 112 that is slideably captured in a linear tracking slot 118 of an unlatching lever 120. A lower end 122 of the intermittent lever 116 is pivotably mounted to a first end 124 of a locking lever 126 by a bifurcated protrusion 123 of the intermittent lever 116 that is biasingly engaged in a hole in the locking lever 126 to provide for quiet anti-rattle rotation. As shown in Figures 3 and 6, the intermittent lever 116 is interposed between the locking lever 126 and unlatching lever 120 on one side, and the rear base wall portion 86 of the housing 12 on the other. An integrally moulded finger 128 of the intermittent lever 116 engages the rear base wall portion 86 to snugly bias the intermittent lever 116 against the locking lever 126 and the unlatching lever 120 to prevent rattling. The intermittent lever 116 moves with the locking lever 126 between an unlocked position shown in solid line in Figures 2 and 3 and a locked position shown in phantom.

The rotation of the pawl release lever 100 is dependent on the position of the intermittent lever 116, which is part of the locking mechanism, and the rotation of the unlatching lever 120, which is part of the unlatching mechanism. The unlatching mechanism will be discussed more fully before the discussion of the locking mechanism.

Referring to Figures 2 and 6, the unlatching lever 120, whose slot 118 receives the integral pin 112 of the intermittent lever 116, is pivotably mounted on the pawl stud 62 between a shoulder 130 of the pawl stud 62 and a non-metallic plastic moulded outside operating lever 132. A coil torsion spring 134 encircles the pawl stud 62 between the rib 102 and the shoulder 130, and it has a leg 136 which engages an upper edge 140 of the unlatching lever 120, as seen in Figure 3. The other end of the coil torsion spring 134 engages a ramp on the housing 12 so that the torsion spring 134 biases the unlatching lever 120 clockwise to a rest position seen in Figure 3. It should be noted that Figures 1, 5 and 6 are front views while Figure 3 is a rear view. Consequently coil torsion spring 134 biases unlatching lever 120 counter-clockwise in

Figures 1, 5 and 6.

Referring to Figures 3 and 6, the outside operating lever 132, pivotably mounted on the pawl stud 62 and interposed between the back plate 92 and the unlatching lever 120, seats on a lateral tab 146 of the unlatching lever 120. Referring to Figure 3, an outside door handle (not shown) rotates the outside operating lever 132 counter clockwise to unlatch the vehicle closure latch 10. The outside operating lever 132 rotates the unlatching lever 120 counter clockwise simultaneously from their rest positions to their respective unlatching position, shown in phantom in Figure 3. When released the outside operating lever 132 is returned to its rest position by the lateral tab 146 of the unlatching lever 120 transferring the bias of the torsion spring 134. A lateral tab 148, best seen in Figures 3 and 6, of the back plate 92 limits the clockwise motion of the outside operating lever 132 and the unlatching lever 120.

Referring to Figures 3, 4 and 6, a non-metallic plastic moulded inside operating lever 150 is also capable of rotating the unlatching lever 120 to an unlatching position against the bias of torsion spring 134. The inside operating lever 150 is pivoted at 152 to a side flange 154 of the back plate 92 and it has a leg 156 underlying a leg 158 of the unlatching lever 120. The inside operating lever 150 is connected to and rotated by an inside operating handle, not shown. When inside operating lever 150 is rotated clockwise as viewed in Figures 4 and 6, it rotates the unlatching lever 120 counter clockwise is viewed in Figure 3 (clockwise as viewed in figure 6).

Now that the operating levers of the unlocking mechanism have been described fully, the description of the locking mechanism will be completed. Referring to Figures 1 and 2, the locking lever 126 is pivotably mounted at 160 between a portion of the housing 12 and the back plate 92 by an integral protrusion of the housing 12 that fits in a pivot hole in the locking lever 126 and a stud of the locking lever 126 that fits in a pivot hole 127 in the back plate 92. The locking lever 126 includes an integral deflectable web 162 having a shoulder 166 biased into engagement with either a first recess 168 or a second recess 170 of the back plate 92 is shown in Figure 2 to locate the locking lever 126 in either the unlocked position shown in solid line in Figure 1 or in the locked position shown in phantom. The deflectable web 162 also provides tactile feel of the locking mechanism establishing positive position of the locking lever 126 in either the locked or unlocked position. The deflectable web 162 is made deflectable by spaced U-shaped portions connecting the shoulder 166 to the main part of the locking lever 126, as shown in Figure 2.

The first end 124 of the locking lever 126 has an opening which is connected to an outside key cylinder by rod, or other suitable means, to move the locking lever 126 between the locked and unlocked positions.

Referring to Figures 1 and 4, a non-metallic, plastic moulded inside locking lever 172 is pivotably mounted to the side flange 154 of the back plate 92 at pivot point 173. The inside locking lever 172 is conventionally connected to an inside lock operator such as a linearly shiftable slide button. The inside locking lever 172 includes a leg 174 which is received within a tapered opening 176 at a second end 178 of the locking lever 126 such that movement of the inside locking lever 172 moves the locking lever 126 between its corresponding locked and unlocked positions. The inside locking lever 172 is identical to the outside operating lever 132 to reduce manufacturing cost.

With the unlatching mechanism and the locking mechanism described, the interaction between the two will be described. Referring to Figures 2 and 3, when the locking lever 126 and the intermittent lever 116 are in the unlocked position, thereby the integral pin 112 of the intermittent lever 116 is at a lower end 180 of the linear tracking slot 118 in the unlatching lever 120 in alignment for engagement with the offset foot 110 of the pawl release lever 100. Consequently, when the unlatching lever 120 is rotated counter clockwise by either the outside operating lever 132 or the inside operating lever 150 from the rest position to the unlatching position shown in phantom in Figure 3, the integral pin 112 of the intermittent lever 116 engages the offset foot 110 of the panel release lever 100 rotating the panel release lever 100 and simultaneously rotate the pawl 60 to the unlatching position shown in phantom in Figure 1. This disengages the pawl tooth 76 from the primary latching tooth 56 of the ratchet 42 which is then rotated clockwise by the compression spring 52 and/or the striker 188 during door opening to the unlatched position shown in Figure 5. Compression spring 70 returns the pawl 60 to the latched position when the unlatching lever 120 is released. During this unlatching movement, the intermittent lever 116 rotates about the bifurcated protrusion 123 which pivotally connects the lower end 122 to the locking lever 126.

When the locking lever and the intermittent lever 116 are in the locked position as shown in phantom in Figures 1 and 2 the integral pin 112 of the intermittent lever 116 is at an upper end 182 of the linear tracking slot 118 in the unlatching lever 120. Consequently when the unlatching lever 120 is rotated counter clockwise by either the outside operating lever 132 or the inside operating lever 150, the integral ear 111 of the intermittent lever 116 misses the offset foot 110 moving into a slot

184 of the pawl release lever 100 so that pawl release lever 100 and the pawl lever 60 are not rotated to the unlatching position and the pawl tooth 76 remains engaged with the primary latching tooth 56 of ratchet 42.

With the operating levers or unlatching mechanism and locking mechanism and their interaction described, the interaction of the vehicle closure latch 10 with the striker 188 will be described. Referring to Figures 2 and 6, the striker 188 is formed out of a one-piece stamping which includes a mounting plate portion 190 having a pair of holes 192 for mounting to a vehicle body structure such as a vehicle pillar. Referring to Figure 1, a loop striker portion 194 of rectangular cross section of the striker 188 includes an outboard leg 198 and an inboard leg 196. The outboard leg 198 is received in a throat 200 of the ratchet 42 of the vehicle closure latch 10 when the vehicle closure latch 10 is in the latched position.

Referring to Figures 1 and 6, the housing 12 of the vehicle closure latch 10 has a deep recess 202 that extends inwardly from the base wall 18 to a back wall 204. The inner end of the recess 202 hooks back to form a spring arm 208 in co-operation with a slot through the back wall 204 as best shown in Figure 3. A symmetrical elastomer bumper 206 is laterally inserted into the inner end of the recess 202 with the lower portion of the symmetrical elastomer bumper 206 being snapped past and held in place by the spring arm 208. The recess 202 defines a throat 210 within the plastic housing 12 to receive the striker 188. The frame 26 includes a "fishmouth" slot 212 that aligns with the throat 210 of the housing 12 when the frame 26 is attached. The side tabs 32 and 33 of the frame 26 project into slots of the housing 12 that communicate with the throat 210 as shown in Figures 1, 5 and 6. These side tabs 32,33 retain the ratchet 42 inside the plastic housing 12 in the event that the ratchet stud 36 and the plastic housing 12 itself do not do so.

Referring to Figure 2, the vehicle closure latch 10 is held together as an assembled door latch by the ratchet stud 36 and the pawl stud 62 which have their ends peened at the recessed portions 94 and 96 of the back plate 92 respectively. The ratchet stud 36 holds the plastic housing 12, metal frame 26 and back plate 92 together and also pivotally retains the ratchet 42 between the base wall 18 of the housing 12 and the metal frame 26. The pawl stud 62 peened at both ends helps align frame 26, housing 12, and back plate 92 and pivotally locates the pawl 60, the pawl release lever 100, the unlatching lever 120, and the outside operating lever 132 and carries the coil torsion spring 134. As stated above, the locking lever 126 is pivotably mounted at 160 and disposed between the housing 12 and the back plate 92. The inside operating lever 150 and the inside locking lever 172 are pivotally mounted on the side flange 154 of the back plate 92.

Referring to Figures 2 and 6, the assembled vehicle closure latch 10 is installed in a vehicle closure, such as a door 220, with the frame 26 abutting an interior surface of a free end wall 221 of the swingable door 220. The recessed corner portion 28 and the extruded central portion 30 of the metal frame 26 accommodate the head of the ratchet 42 and the peened head of the pawl 60 respectively. The end wall 221 and inner panel 223 of the door 220 have communicating slots that define an opening 222 that aligns with the throat 210 of the plastic housing 12 and the fishmouth slot 212 of the frame 26.

The vehicle closure latch 10 is attached to the door 220 by a pair of bolts 240 and 242 that are inserted into openings 236 and 238 in the end wall 221 through holes 232 and 234 in the frame 26 and holes 228 and 230 in the housing 12 and then screwed into threaded apertures 224 and 226 in the back plate 92. The bolts 240 and 242 also provide additional fasteners that hold the parts of the vehicle closure latch 10 together when the vehicle closure latch 10 is installed snug against the end wall 221.

Bolt 240 extends through the vehicle closure latch 10 in proximity to where the pawl tooth 76 of the pawl 60 engages one of the latching teeth 56 and 80 of ratchet 42 and sandwiches the engaged teeth between the housing 12 and the frame 26 so that the engaged teeth remain coplanar and do not bypass each other. In addition, the bolt 240, the ratchet stud 36 and the pawl stud 62 define an imaginary triangle that contains the engaged teeth of the ratchet 42 and pawl 60 between the housing 12 and the frame 26 providing further assurance that the engaged teeth do not bypass each other.

Bolt 242 extends through the vehicle closure latch 10 in proximity to where the ratchet 42 engages the striker 188 when the ratchet 42 is in the latched position shown in Figure 1. The ratchet stud 36 is about the same distance away on the opposite side of the throat 210 and the latched inboard leg 196. The bolt 242 and the ratchet stud 36 both retain the vehicle closure latch 10 together and sandwich the ratchet 42 between the housing 12 and the frame 26 so that the ratchet 42 is held against lateral movement on both sides of the throat 210 near the engaged inboard leg 196 of the striker 188. Consequently there is a very strong latching engagement of the striker 188.

The side tab 32 of the frame 26 protects the plastic housing 12 if the striker 188 is misaligned relative to the vehicle closure latch 10 and initially engages the throat 210 lower than desired. More-

over, as indicated earlier the side tabs 32 and 33 which are on opposite sites of the throat 210 are also positioned inboard of the ratchet 42 so that it cannot be pulled out of the plastic housing 12 by the striker 188 as shown in Figure 1 thereby enhancing the overall strength of the vehicle closure latch 10 under failure producing loads. It should also be noted the throat 210 of the plastic housing 12 and the fishmouth slot 212 of the cover plate 26 are relatively narrow when the vehicle closure latch 10 is designed for use with the striker 188 which is characterised by a loop portion of rectangular cross section. This relatively narrow fishmouth slot 212 further enhances the overall strength of the vehicle closure latch 10 because the minimum thickness of the metal plate 26 between the hole in the central portion 30 and the fishmouth slot 212 is increased in comparison to designs that are used with striker loop portions of circular cross section and that have the same operating effort. The striker 188 is the subject of our US patent no. 5,263,752.

Referring to Figures 1 and 5, as the door 220 is being closed, the outboard leg 198 of the striker 188 enters the throat 210 and engages the bumper 53 of the ratchet 42 and rotates the ratchet 42 counter clockwise from its unlatched position shown in Figure 5, to its latched position shown in Figure 1. The striker 188 is stopped in the latched position by the elastomer bumper 206. During this latching movement, the pawl tooth 76 first ratchets over the secondary latching tooth 80 and then the primary latching tooth 56 of the ratchet 42 until it engages the back side of the primary latching tooth 56 under the bias of compression spring 70.

This operation is quiet due to the sound deadening covering 48 of the ratchet 42 which is best shown in Figure 7. First the striker 188 engages the slotted bumper 53 which isolates the metal substrate 46 and deflects because of the slot to absorb the energy and sound of the striker 188 engaging the ratchet 42. Secondly the peripheral portion of the covering 48 absorbs most of the energy and sound of the pawl 60 as the pawl tooth 76 ratchets on the ratchet 42 into position behind the primary latching tooth 56. Thirdly the latched inboard leg 196 is stopped by the elastomer bumper 206 and held by the cushion 55 of the keeper portion 57 of the ratchet 42. This absorbs the energy and sound of the striker 188 when the door 220 is closed.

Referring to Figure 2, the initial engagement and rotation of the ratchet 42 by the striker 188 creates a load on the thin plastic sleeve 37 that is generally uniform across the thickness of the ratchet 42. The thin plastic sleeve 37 that is integrally attached to the base wall 18 of the housing 12 in service without a radius which creates a stress riser at the corner of the sleeve and the base wall. The combination of the striker load and the stress riser causes the corner to fracture so that the thin plastic sleeve 37 breaks away from the base wall 18 of the housing 12 in service to provide a plastic sleeve bearing 38 between the metal ratchet stud 36 and the metal bore of the ratchet 42 that functions as a silencer.

Unlatching the vehicle closure latch 10 to open the door 220 is accomplished by releasing the striker 188 from the throat 200 of the ratchet 42 by disengaging the pawl tooth 76 from the primary latching tooth 56 so that the coil compression spring 52 returns the ratchet 42 to the unlatched position as described earlier. The door seal force also assists in latch disengagement of the striker 188.

The extensive use of non-metallic or plastic parts, except for the ratchet 42, the pawl 60 and the associated studs and springs which are required to hold the vehicle closure latch 10 in the latched position, the plastic covering of the ratchet 42 and the break-away sleeve bearing 38 reduces the metal-on-metal contact to a minimum thereby creating a vehicle closure latch that is very quiet in operation and that requires little if any lubrication. Furthermore, the integral finger 128 of the intermittent lever 116 and the internal deflectable web 162 of the locking lever 126 reduce vibration of these parts and the associated noise to enhance quiet operation.

The vehicle closure latch 10 shown in the Figures is a right-hand closure latch used on the passenger side of a vehicle. A left-hand closure latch for the driver side of the vehicle work the same, but the latches are mirrored images of each other. Consequently, some parts of the latch are designed so that they can be used for either a right-hand or left-hand closure latch to reduce manufacturing cost. For example, the pawl 60 and outside operating lever 132 are non-handed and can be used on either a right-hand or a left-hand closure latch by flipping the part over. The metal substrate 46 of the ratchet 42 is also non-handed and capable of being used in either latch, prior to being insert moulded, where the pin 53 is added to one side of the cover. The right angled elastomer bumper 206 is symmetrical about multiple planes so that the bumper 206 can be used one-way for a right hand latch or rotated 90° for a left hand latch. In addition, the inside operating lever 150 and inside locking lever 172 are also identical to further reduce manufacturing costs.

Claims

1. A vehicle closure latch (10) for mounting on a vehicle closure (220) so as to engage and retain a striker (188) mounted on a vehicle body when the vehicle closure is closed, the

vehicle closure latch comprising a housing (12) that has a movably mounted metal pawl (60) and a base wall (18) that has a hole extending through it for receiving a ratchet stud (36); and a ratchet (42) that is pivotally mounted on the ratchet stud, the ratchet having a metal substrate (46) and a plastic covering (48), the metal substrate including a primary latching tooth (56) that has an exposed latching surface positioned for metal-to-metal engagement by the metal pawl.

2. A vehicle closure latch as claimed in claim 1, wherein the metal substrate has a striker tooth (51) and the plastic covering (48) includes a substantially chord shaped area (61) between the primary latching tooth (56) and the striker tooth.

3. A vehicle closure latch as claimed in claim 2, wherein the chord shaped area (61) provides a base for an integral pin (43).

4. A vehicle closure latch as claimed in claim 2 or claim 3, wherein the plastic covering (48) includes a thick portion in front of the striker tooth (51) that is slotted to provide an integral bumper (53) for cushioning initial engagement with the striker (188) when the vehicle closure (220) is closed.

5. A vehicle closure latch as claimed in any one of claims 2 to 4, wherein the metal substrate (46) includes a keeper portion (57) and the plastic covering (48) includes a cushion (55) covering the keeper portion for engagement with the striker (188) when the ratchet (42) is in the latched position.

6. A vehicle closure latch as claimed in any one of claims 2 to 4, wherein the metal substrate (46) includes a keeper portion (57) and a secondary latching tooth (80) between the keeper portion and the primary latching tooth (56), and the plastic covering (48) includes a cushion (59) that covers the periphery of the metal substrate between the keeper portion and a peak of the primary latching tooth for engagement by the pawl (60) as the pawl ratchets over the secondary latching tooth when the vehicle closure (220) is closed.

7. A vehicle closure latch as claimed in any one of claims 1 to 6, wherein the metal substrate (46) is injection moulded in a covering of relatively tough and stiff thermoplastic material to form the plastic covering (48).

8. A ratchet (42) for a vehicle closure latch (10) as claimed in any one of claims 1 to 7, that is mountable on a vehicle closure (220) so as to engage and retain a striker (188) mounted on a vehicle body when the vehicle closure is closed, the ratchet comprising a metal substrate (46) and a plastic covering (48), the metal substrate having a primary latching tooth (56) for engaging a pawl (60) of the vehicle closure latch to retain the ratchet in a latched position and a striker tooth (51) for engagement with the striker when the ratchet is in an unlatched position, and the plastic covering having a substantially chord shaped area (61) between the primary latching tooth and the striker tooth that excludes the metal substrate.

9. A ratchet as claimed in claim 8, wherein the chord shaped area (61) includes an integral pin (43) for engaging a return spring (52) of the vehicle closure latch (10).

10. A ratchet as claimed in claim 9, wherein the primary latching tooth (56) has an exposed latching surface that is positioned for engagement by the pawl (60) and the metal substrate (46) includes a keeper portion (57) and a secondary latching tooth (80) between the keeper portion and the primary latching tooth and the plastic covering (48) covers the periphery of the striker tooth and the periphery of the metal substrate from the striker tooth up to a peak of the primary latching tooth for engagement by the pawl as the pawl ratchets over the secondary latching tooth to engage the primary latching tooth.

11. A ratchet as claimed in any one of claims 8 to 10, wherein the metal substrate (46) is injection moulded in a covering of relatively tough and stiff thermoplastic material to define the plastic covering (48).

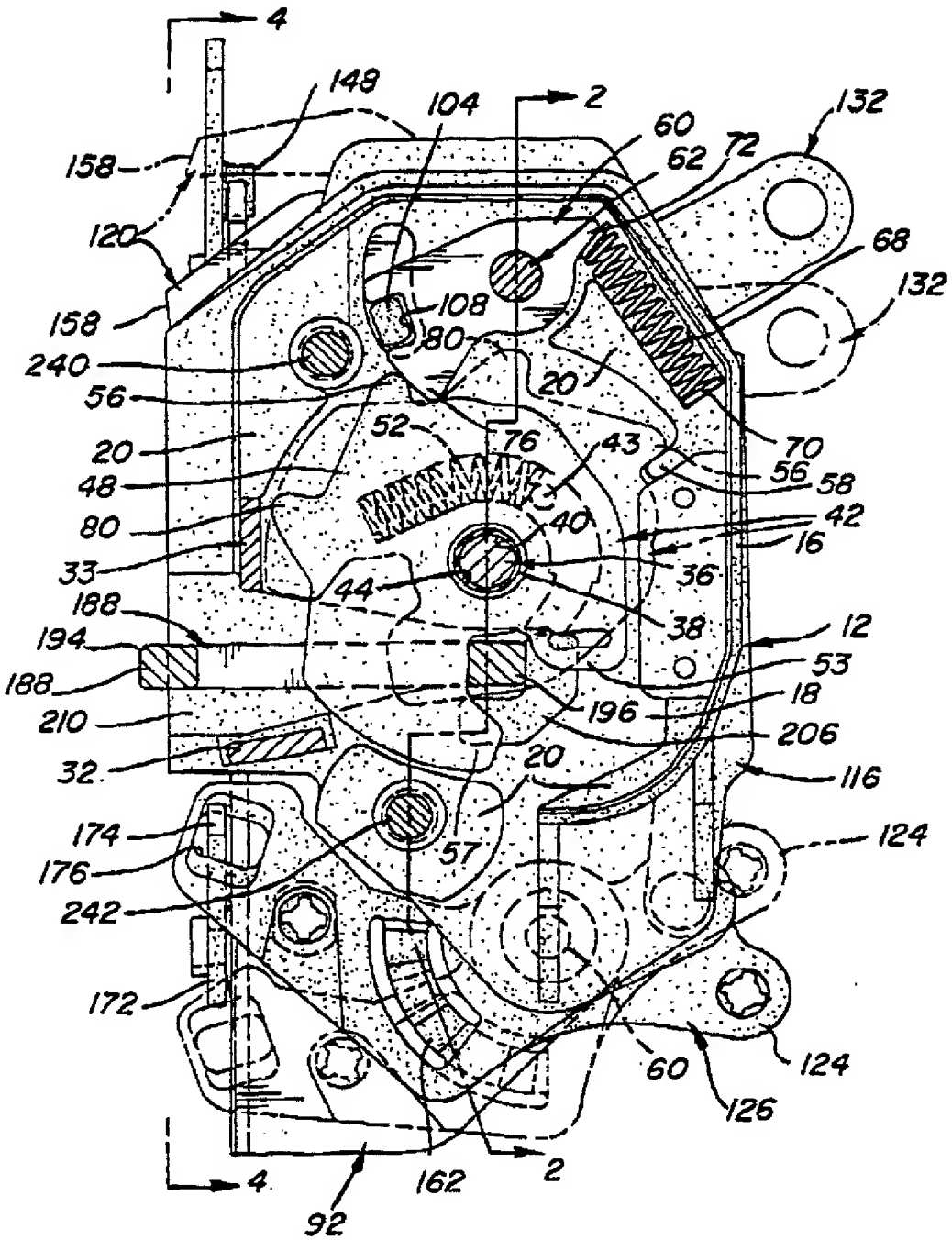

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FIG-1

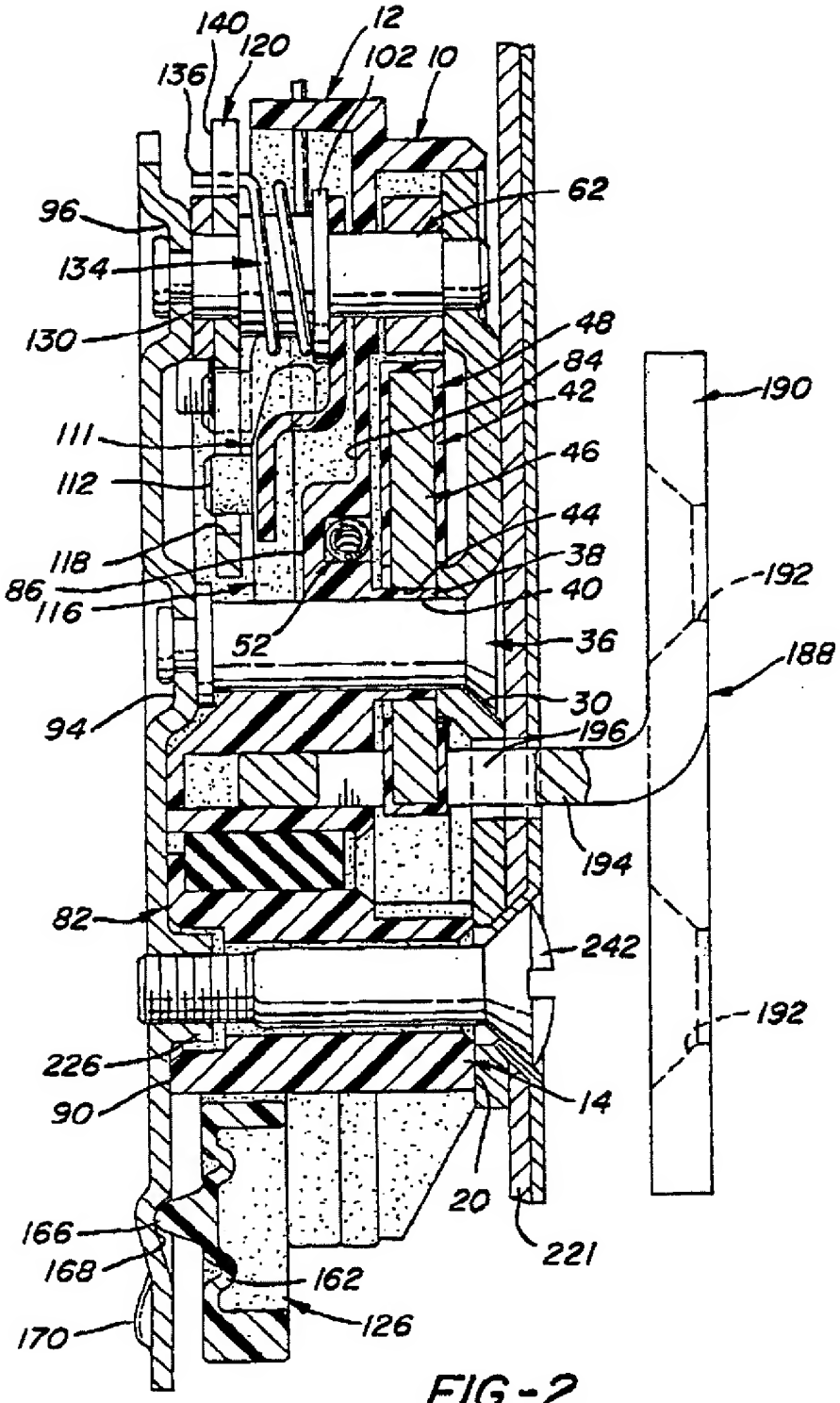
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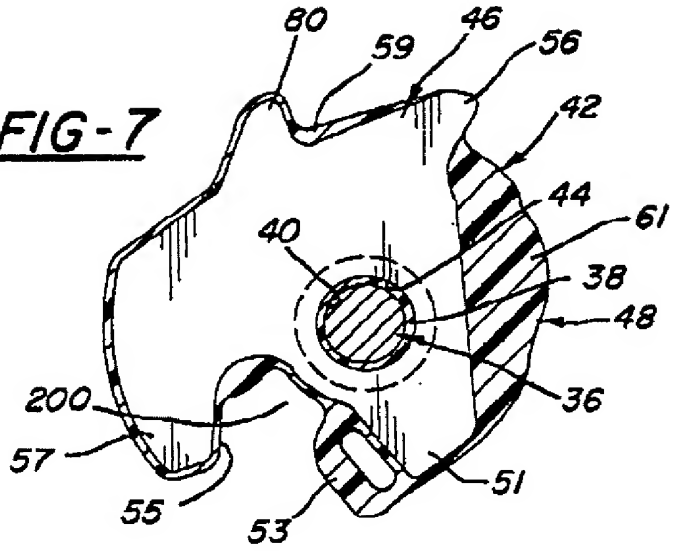
FIG-2

FIG-7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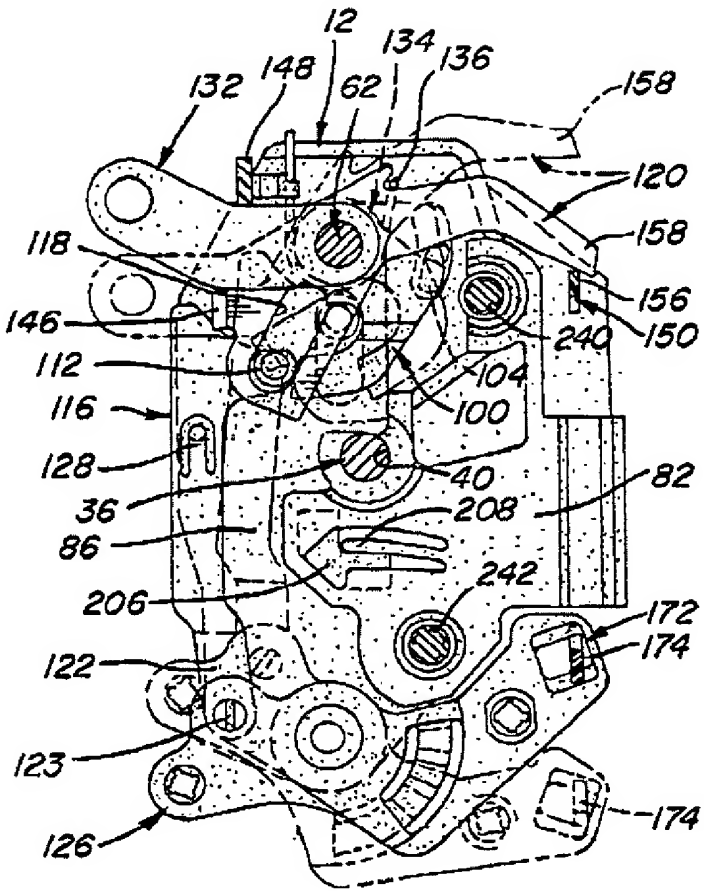
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FIG-3

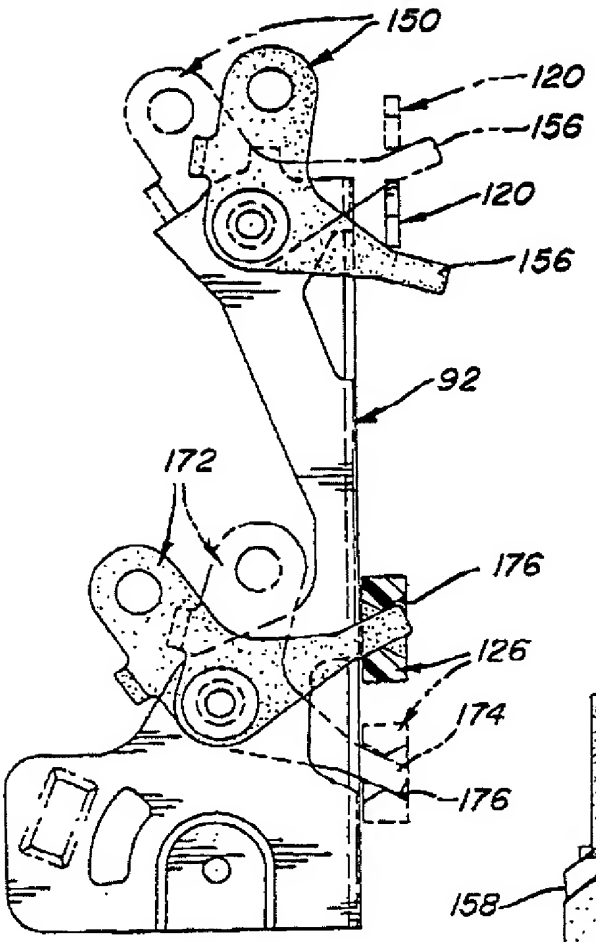
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FIG-4

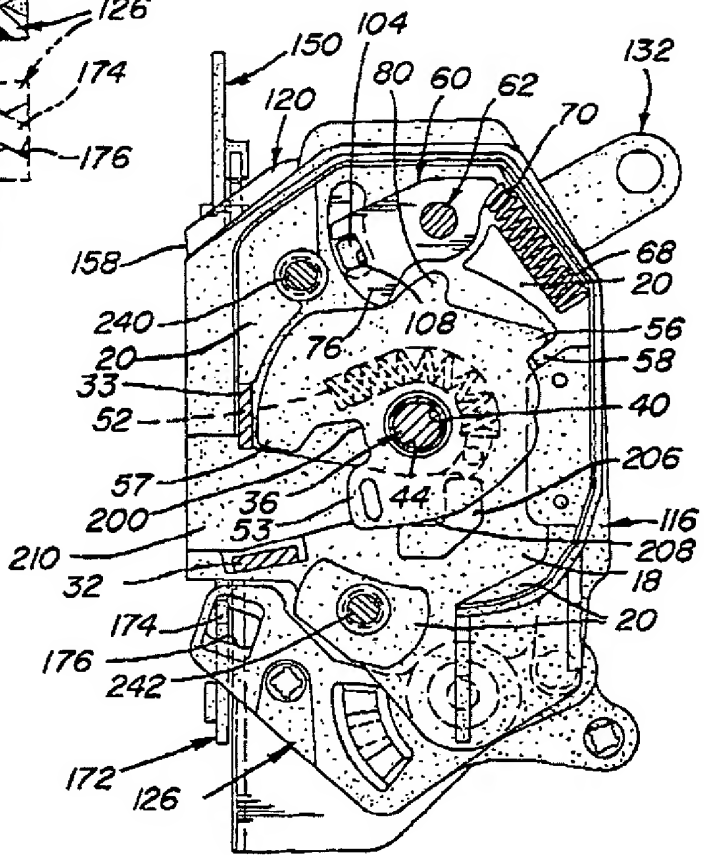
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FIG-5

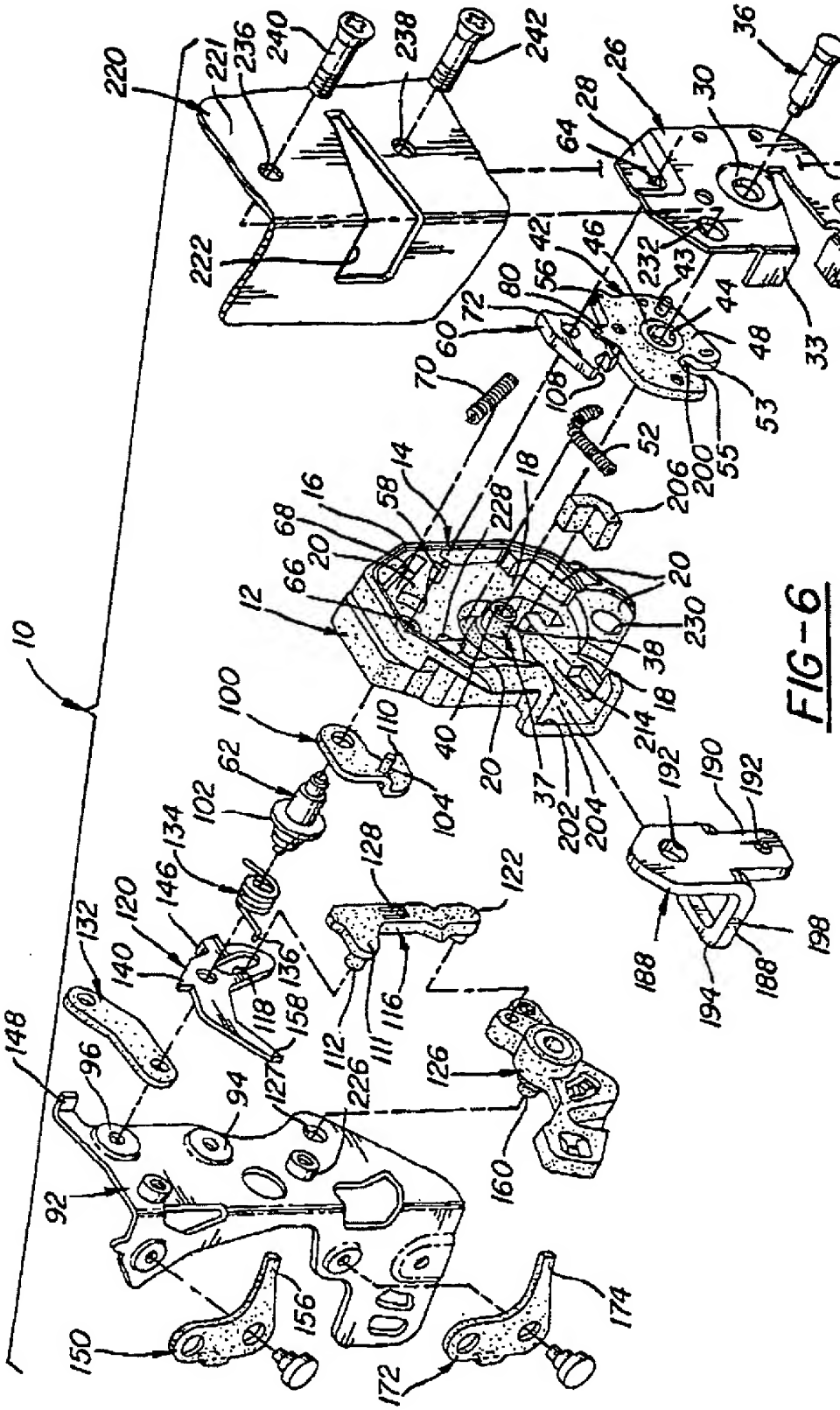
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FIG-6

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 94 20 0512

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	US-A-4 756 564 (IKEDA) * the whole document *	1,7,8,11	E05B17/00
X	DE-A-37 21 023 (HAYAKAYA) * the whole document *	1,7,8,11	
A	US-A-3 767 243 (YOSHIMURA) * the whole document *	1-3	
D,A	US-A-4 756 563 (GARWOOD)		
D,A	US-A-5 263 752 (PHAIL-FAUSEY)		

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

E05B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	19 July 1994	Verelst, P

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